



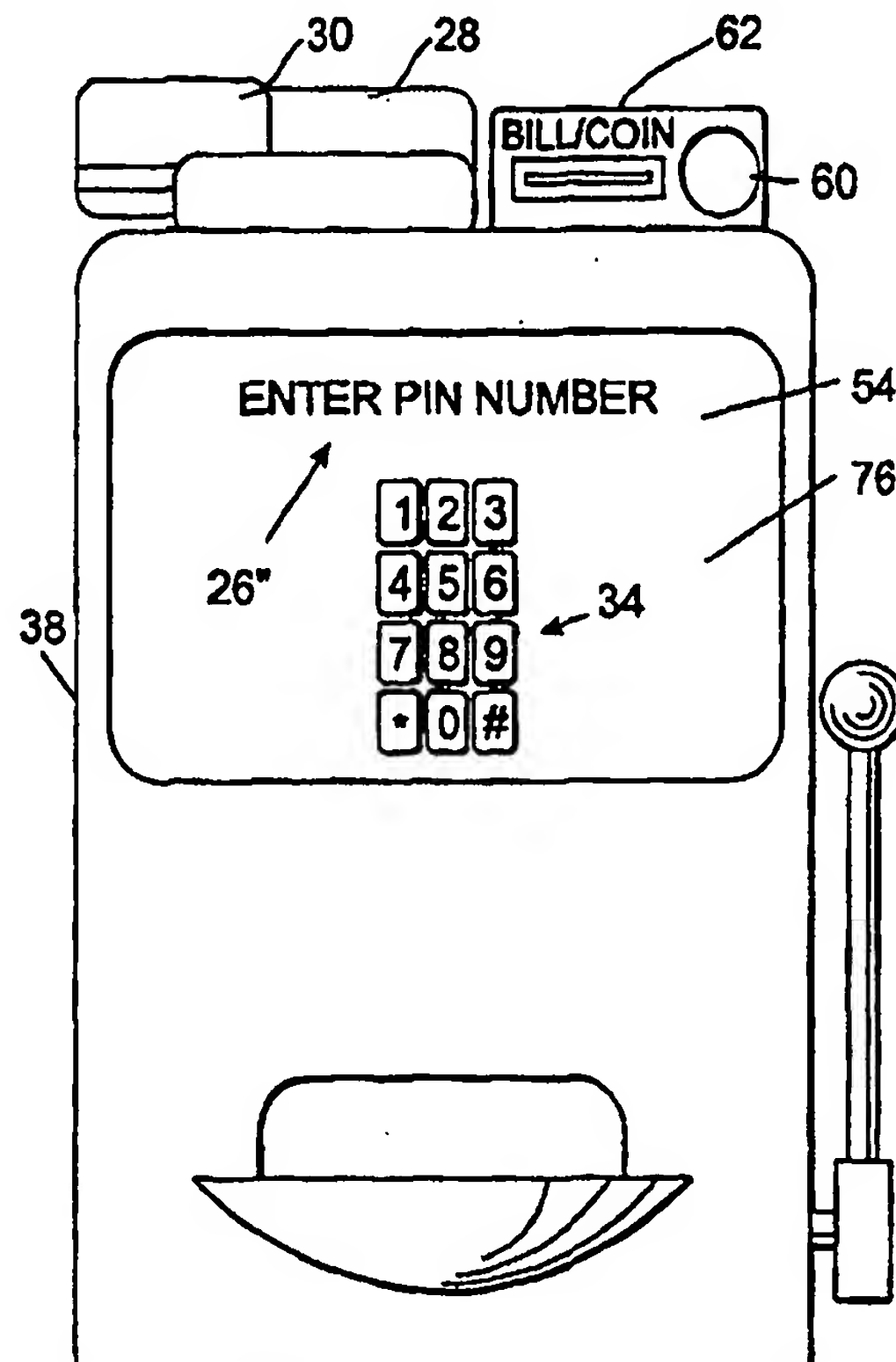
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US96/10970</p> <p>(22) International Filing Date: 5 July 1996 (05.07.96)</p> <p>(30) Priority Data: 08/500,476 10 July 1995 (10.07.95) US</p> <p>(71) Applicant: CAESARS WORLD, INC. [US/US]; 1801 Century Park, East Los Angeles, CA 90067 (US).</p> <p>(72) Inventors: BELL, Lyle, L.; 5475 Fire Island Drive, Las Vegas, NV 89120 (US). BROLICK, Anthony, J.; 805 Del Monte Lane, Boulder City, NV 89005 (US). SCOTT, Daniel, H.; 2690 Creek View, Las Vegas, NV 89117 (US).</p> <p>(74) Agent: SCHELLIN, Eric, P.; Suite 704, 2121 Crystal Drive, Arlington, VA 22202 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: COMBINED CASHLESS/CASH GAMING MACHINE

## (57) Abstract

This relates to casino gaming machines such as slot machines (38), and, more particularly, to a gaming machine having cash or no cash playing capability (12, 28, 30). More particularly, a gaming machine (38) having a code generating apparatus (52, 49, 56) for generating a unique authorization code (30), a credit card having a means for recording (43) the code, a gaming machine having a system of play authorizing input, a cash acceptance apparatus (52, 60, 62) for accepting a unit of cash, and for authorizing a play of the gaming machine. Further, the system includes a plurality of gaming machines (38) connected to a central computer (40) and to security measures for use in such machines.



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## COMBINED CASHLESS/CASH GAMING MACHINE

BACKGROUNDField of the Invention

5 The present invention relates to casino gaming machines such as slot machines and, more particularly, to a gaming machine having cash or cashless playing capability.

Description of the Related Art

10 With the advent of the computer age and modern electronics, casino gaming machines have undergone a vast change in recent years. For many years, such machines were mechanical devices like the slot machine 10 of Figure 1. Coins were inserted into the slot 12 and the handle 14 pulled by the player. Within the main window 16, three  
15 wheels 18 were spun behind individual windows 20 by the pulling of the handle 14. The wheels 18 had various indicia 22 on them at spaced peripheral positions. Depending upon the type of indicia and matching thereof appearing in the individual windows 20 when the wheels 18  
20 stopped spinning, the player would win or lose that play of the machine. Upon winning, coins representing the amount won were dropped into the coin dish 24 from a coin hopper (not shown) within the slot machine 10.

25 The first step into the electronic and computer age was as depicted in Figure 2 with the slot machine 10'. The main window 16 was replaced by a cathode ray tube (CRT) display screen 26. The wheels 18 were replaced by internal computer logic (not shown) and an animated display 28 of the calculated results of a "spin" displayed on the CRT  
30 display screen 26. The operation of each play was initiated by the insertion of one or more coins into the

slot 12 as with the mechanical machine 10 of Figure 1. Slot machines of the type shown in Figures 1 and 2 are still in use today.

Coins are cumbersome and the mechanical devices which accept them are prone to wear and failure. Thus, the use of cards or other devices for a so-called "cashless" gaming machine has been an object of desire for many people within the gaming industry. The typical prior art approach is depicted in Figure 3. The coin slot 12 is replaced by a reader 28 which can read a identification card 30 or some similar approach. According to one prior art scheme, an identification card 30 is read in and the payout is by means of a printed voucher which can be redeemed at the casino's pay booths. In another prior art approach, the identification card 30 is actually a so-called "smart card" containing a computer memory chip which can be credited and debited electronically.

There has also existed a need to allow players to access outside financial institutions from the casino by having an automated teller machine (ATM) type of interface at the gaming machine. In the typical ATM interface as depicted in Figure 4, there is a reader 28 which reads the magnetic stripe of an identification card 30 (or debit card). There is also a CRT display screen 26' and a numerical keypad 34 into which the user can input his/her personal identification number (PIN) so as to authorize use of the identification card 30 for the particular transaction. The ATM interface 32 communicates with the remote financial institution over the telephone wires 36 connected thereto.

As those skilled in the gaming art understand, any

gaming machine must appeal to the user or the cashbox will diminish. In other words, a player will play those games that are appealing and will avoid those which are not. Some people like the feel and the sound of coins dropping into the coin dish 24. If that appeal is not available for them, they will not play the machine.

The gaming commissions of the various states where gambling is legal are also very wary of any payment or credit scheme that can be subject to potential abuse. Coins or tokens are hard to abuse. Credit cards and debit cards, on the other hand, provide the potential for great abuse. Possession of a person's credit/debit card and the PIN therefor can be used to transfer substantial amounts of money in a very short time. If the money was used to gamble and lost, even if the electronic thief is caught, there is no way to recover the money.

Esthetics and appearance are a large part of the gaming industry. The casino and its total ambiance are made such as to encourage the players to want to spend time there and play the games. Also, floor space in the casino is at a premium. Space not available for gaming machines represents lost revenue. The use of large ATM type interface devices such as that of Figure 4 could result in space for fewer machines in a given floor area. Not only that, they could adversely effect the ambiance. The having of coins or other media of play is a positive for a player. The need to obtain credit in a manner for all to see is a negative. Winners do not need credit. Not only that, since a player's personal PIN number associated with a credit card or debit card is the only obstacle to unauthorized use of the card, it is highly desirable to

provide a way in which the card can be used unobtrusively and with a minimized chance of the PIN number being observed during its input.

Therefore, it is an object of this invention to  
5 provide an electronic gaming system in which both cash and credit can be employed, which will overcome the above limitations and disadvantages.

It is another object of this invention to provide an electronic gaming system in which there is a high degree of  
10 security and privacy attached to credit transactions.

It is a further object of this invention to provide an electronic gaming system in which the possibility for illegal electronic value manipulation is minimized.

Other objects and benefits of the invention will  
15 become apparent from the detailed description which follows hereinafter when taken in conjunction with the following drawings and specification.

#### SUMMARY OF THE INVENTION

More particularly, the invention relates to a gaming  
20 machine system having a central computer for generating a unique identification code; for storing player credit; for storing a personal identification number (PIN); a player identification card having a means for recording the identification code; a gaming machine having a system for  
25 reading the identification code on the identification card, and input means for the player to enter the PIN and for transferring credit stored in the central computer to the gaming machine for play. A plurality of gaming machines are connected to a central computer and to security

measures for use in such machines.

In the preferred embodiment, the central computer also stores the electronic funds transfer history of each of the separate gaming machines and contains logic means for disabling a particular gaming machine if the funds transfer history stored in the particular gaming machine is different from the electronic funds transfer history for that particular gaming machine stored in the central computer.

Preferably, each gaming machine also includes a display for displaying alphanumeric messages to a player and a keypad for a player to input the PIN, the amount of credit requested and to respond to other messages.

The preferred embodiment also includes security means for making the input of the PIN on the keypad difficult to visually steal by an observer. This may comprise positionally changing number positions in the keypad each time it is displayed.

For cash play, each of the plurality of gaming machines may include cash acceptance apparatus for accepting a unit of cash and for authorizing immediate play of the gaming machine.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simplified drawing of a prior art coin-operated, mechanical slot machine.

Figure 2 is a simplified drawing of a prior art coin-operated, electronic slot machine with a CRT display.

Figure 3 is a simplified drawing of a prior art credit card-operated, electronic slot machine with a CRT display.



Figure 4 is a simplified drawing of a typical prior art automated teller machine (ATM) type credit interface.

Figure 5 is a simplified drawing and combined functional block diagram of a combined coin/coinless electronic gaming system according to the present invention.

Figure 6 is a more detailed functional block diagram of the combined coin/coinless electronic gaming system of the present invention.

Figure 7 is a logic diagram of logic which can be used in the casino computer of the present invention.

Figure 8 is a logic diagram of logic which can be used in the slot machine computer of the present invention.

Figure 9 is a logic diagram of logic which can be used in the casino computer of the present invention.

Figure 10 is a logic diagram of logic which can be used in the slot machine computer of the present invention.

Figure 11 is a logic diagram of logic which can be used in the casino computer of the present invention.

Figure 12 is a drawing of a slot machine according to the present invention in a preferred embodiment in which the CRT display screen is a touch screen which functions as both the gaming screen and an ATM type interfacing screen shown in the gaming screen mode.

Figure 13 is a drawing of a slot machine according to the present invention in a preferred embodiment in which the CRT display screen is a touch screen which functions as both the gaming screen and an ATM type interfacing screen shown in the ATM screen mode.



A combined cash/cashless gaming system according to the present invention is depicted in Figure 5. A plurality of electronic slot machines 38 are connected to a central computer 40 at a secure location, not accessible to the public. The central computer 40 has at least one input console 42 connected thereto. Each slot machine 38 has a coin slot 12 and a reader 28 for reading the magnetic stripe 43 of an identification card 30 issued by the casino to the player. Any number of different readers may be employed, such as those that read the magnetic stripe when the card is moved relative the reader, or those where the card is read while stationary.

Prior to playing the slot machine, a new player would go to a location in the casino where he/she is issued the identification card 30. The input console 42 is used, in association with standard commercially available magnetic strip encoding devices, to place the unique identification code on the magnetic stripe 43. The player then enters a PIN, preferably at another location within the casino for internal casino security reasons, which is stored in the computer associated with said identification code. An initial amount of monetary value is stored in the central computer 40, associated with the unique identification card. The monetary value stored can represent cash or check given to the casino operator, credit secured by a credit card or debit card from an outside institution, or credit issued by the casino based on its own criteria, or any other source of credit.

The system is depicted from a computer control point of view in Figure 6. The central computer 40 comprises a

computer system including a fault tolerant mainframe computer 44 connected to a system memory 46, a communications interface 48, and the input console 42. Fault tolerant means that the computer 44 is not prone to stopping or "crashing" and maintains all data in a manner such that it will not be lost or compromised should an unforeseen event (such as an extended power loss or the like) cause the computer 44 to stop and have to be restarted. Preferably, the computer 44 is connected to an UPS (uninterruptable power supply) system and all memories described herein are self maintaining.

The central computer 40 is connected to the slot machines 38 through a secure communications system 50. Techniques for communicating in a secure manner are known to those in the communications and computer arts. Therefore, this aspect will not be addressed in any detail herein.

Each slot machine 38 has a system interface 49 interfacing it to the communications system 50. It also has a credit interface 52 comprising a display 54, a keypad 34, and a card reader 28 which is accessed through the system interface 49. There is a machine CPU (i.e. computer) 56 that performs the logic implemented in the slot machine to accomplish the game being played as well as the functions of the present invention as described hereinafter. The machine CPU 56 is connected to the system interface 49 and credits (and other necessary information) are transmitted over the connection. The machine CPU 56 controls the hopper mechanism 58 whereby the slot machine 38 can dispense cash to a player. There is also a coin acceptor 60 connected to the CPU 56. Optionally, a bill

acceptor 62 can also be provided.

The manner in which the system operates and its unique features can best be understood by reference to representative logic which can be implemented in the computer mainframe 44 and each of the machine CPU 56. Representative logic will now be described referring first to Figure 7. The logic 66 issues a identification card 30 having its own unique identification number imprinted into the magnetic stripe 43. The PIN selected by the player as described above is also stored.

At the same time, the logic 66 stores the initial dollar value of available credit and the PIN is stored into the system memory 46 indexed by the unique identification number of the identification card 30. The identification card 30 and player can then be tracked and checked during the play period which follows.

Instead of a card having a magnetic stripe, other media, such as a smart card, could also be employed. The smart card could have any means for identifying the player such as thumb print, etc.

Turning now to Figure 8, there is logic 68 implemented in the CPU 56 of each slot machine 38. The logic 68 constantly checks to see if a new player is playing the machine. If not, it continues its present play mode. When a new player appears, access is made either by inserting a coin (or bill) into the slot machine or by passing the identification card 30 through the reader 28. When in the coin/bill mode, the slot machine 38 can be played by any player having a coin or bill with which to play. When the player has the slot machine 38 read his/her identification card 30, a new mode of operation of the slot machine 38 is

begun. Once the identification card 30 is inserted and the first transfer of funds is made, no further payout from the hopper of the slot machine 38 is permitted. Under the Federal Credit Act, if money or coins were permitted to be  
5 obtained from the slot machine, there would be a possibility that the casino would be responsible for claims that someone other than the authorized identification card holder obtained the money or coins from the slot machine.

The logic 68 reads the identification code of the  
10 identification card. While it is possible to remove the identification card, it is preferable to have the identification card remain in the gaming machine while the PIN is entered to avoid fraud. The player is then asked to input his/her PIN through the keypad 34. If the PIN  
15 entered on the key pad 34 matches the PIN associated with ID stored in the computer, operations continue. The player enters on the key pad 34 a dollar amount to be transferred for play of the slot machine. The amount can be varied or be a predetermined set amount, i.e. discrete levels.

20 The logic 70 of Figure 9 is implemented in the mainframe computer 44 and is the logic which interfaces with the machine logic 68 of Figure 8. The logic 70 first compares the PIN inputted by the player to the PIN associated with the identification card 30 as contained in  
25 the system memory 46. If there is a match, the logic 70 continues. If there is no match, it may be a simple input mistake by the user. Initially, a "PLEASE TRY AGAIN" message can be output to the display 54. After a pre-established number of tries, there must be a problem. On  
30 the possibility that a stolen card is involved, either security would be dispatched to the slot machine 38 to

investigate, or the card would be disabled. If it is a technical problem, security can provide the player with helpful assistance. When the PIN matches the PIN stored in association with the identification number, the dollar value for the card is then compared to that amount selected by the player on the keypad stored in the system memory 46. If there is available credit for that amount, the requested credit is transferred to the credit meter of the slot machine. In the preferred embodiment, the identification card must be removed to complete the transaction and the slot machine would then be played in its normal mode of operation. This makes it more likely that the player will not leave the identification card in the gaming machine. However, it is possible to have the logic complete the transaction without removing the identification card.

At the end of play, the player reinserts the identification card and again enters the PIN in response to the message on the output display 54. The credit on the meter is transferred to the central computer 40 to the account of the player associated with the identification card. The identification card is then removed. The player can then use the stored credit to play other games, or recover the cash value of the credits from the casino.

The system of the present invention provides a high degree of security and system integrity through a checks and balance system. Part of that system of checks and balances has already been described. Figure 10 shows another aspect of it. Every time a funds transfer is made, in either direction, the logic 72 stores the information in the central computer 40.

The corresponding logic 74 in the mainframe 44 is

shown in Figure 11. The logic 74 receives the credit transaction from the slot machine 38. It then uses the information to independently update its own records for that slot machine 38 within the system memory 46. In addition to maintaining data associated with each identification card 30 from the moment of issue until it is accounted for as no longer in possible play, the system memory 46 also keeps a duplicate set of data on each slot machine 38. If there are no problems, the data for each slot machine 38 in the system memory 46 should exactly match that in the machine's own machine memory 64. Thus, the logic 74 reads the machine memory 64 for the slot machine 38 which just reported the transaction and compares it to the data for that slot machine 38. If there is a match, the logic 74 does nothing. If there is not a match, the slot machine 38 is disabled and maintenance is notified to check the machine.

A final aspect of the present invention in a preferred embodiment is shown in Figures 12 and 13. The display 54 is covered with a touch screen 76. The touch screen 76 can be of any type as well known to those of ordinary skill in the art which senses positional touching of the display 54 by a player's finger or the like. With this added capability, the display 54 functions in two modes.

As depicted in Figure 12, the display 54 spends most of its time in a game mode in which the game or an advertising mode display appears. As depicted in Figure 13, however, when the player is in the credit mode as entered by inserting an identification card 30 into the reader 28, the display 54 acts as the display 26' and the keypad 34 of an ATM type terminal. Thus, the display 54 in combination



with the touch screen 76 operates in a dual mode. As those of ordinary skill in the art will undoubtedly recognize, the presence of the touch screen in a gaming machine increases the capability and possibility of games to be played thereon. Selections of items displayed on the display 54 can be made by touching the screen 76 rather than requiring separate buttons to be provided for the purpose. In an electronic gaming machine, this also allows the game to be changed easily by simply changing a read only memory (ROM) chip in the CPU 56 without concern for buttons and external markings and indicia.

The primary reason for the touch screen 76, however, is for ATM type terminal purposes reducing space requirements and offering greater security and privacy for the player. As seen in Figures 12 and 13 as compared with the drawings of Figures 4 and 6, the entirety of the equipment required to play in a cash/cashless mode as possible with the present invention can be accomplished in a space footprint no bigger than the prior art machines of Figures 1 and 2. The card reader 28 and the bill/coin acceptors 62,60 are located on top of the slot machine 38 and the remaining display and keypad functions are accomplished on the display 54 and touch screen 76. While the credit display ENTER PIN NUMBER and the displayed keypad 34 are shown in conventional manner in Figure 13, this is for convenience of understanding only. In actual practice, various techniques can be used to mask the credit function and to make unauthorized acquisition of the player's PIN more difficult. For example, the display 54 in a credit mode of operation can employ a colored and animated display which appears to the casual user as a game



display rather than announcing to those in the area fact that the player is about to enter a PIN number.

The keypad 34 can also be displayed in a less regular fashion. Anyone familiar with the typical "telephone" keypad configuration of Figure 13 can tell what numbers are being selected by simply watching the position of the user's fingers. If a row and column arrangement is used for the keypad 34, the numbers of the "buttons" can be positionally changed each time the keypad 34 is displayed. Preferably the locations of the numbers and symbols on the screen would be changed relative to each other each time a card was inserted in the ATM. This is done under microprocessor control so that a random display pattern is generated for each new customer. For example, in lieu of the regular locations that are used in the touch tone pad of the telephone, as shown in Figure 13, the pattern would be changed for the next customer. Thus after a customer leaves and the next customer inserts a card, the request to enter a PIN would display a randomly generated location pattern such as:

```
3 7 1
# 9 4
0 8 *
6 2 5 .
```

While this might slow the transaction process for the customer who has memorized one set of ATM locations so as to input the PIN by reflex, it does provide enhanced security.

The buttons of the keypad 34 could also be displayed along the top edge of the display 54 and a small hood attached over the top of the display 54. That way, the buttons

could only be seen by a player from his/her position seated in front of the display. The player would have to reach up under the hood to enter the PIN. By also positionally changing the numbers of the buttons as described above, 5 casual observers would be virtually unable to obtain unauthorized knowledge of the player's PIN.

While in the preferred embodiment the use of a magnetic read only card was described, it is recognized that other means of recording and inputting data may be 10 used, such as memory chips, without departing from the scope of the invention. Also, media other than a card could be used.

Also, the casino may transfer additional credits to the players account or slot machine at any time. This 15 would typically be in association with play credit cards that are accumulated by the player when using a slot machine to encourage play. Such additional credits can be issued at any time. The play credit card is inserted into the card reader after the identification card 30 is removed 20 after credit is obtained.

Also, while it is possible to have the receipts from ATM credits obtained at the gaming machine, it is also possible to have a summary of all ATM activity stored on a single record of the transactions issued to the player from 25 a central location.

What is claimed is:

1. A gaming machine system for use with a plurality of media each capable of storing a unique identification code associated with each of said medium, comprising:

5 a plurality of gaming machines each having means for reading said unique identification code from said plurality of media;

a central computer in communication with said plurality of gaming machines for storing a unique identification code and the credit associated with said code; and

an authorizing code associated with said identification code and means associated with said gaming machine for inputting said authorization code; and

means for authorizing and transferring funds for play of said gaming machine to said gaming machine in response to the entry of a proper authorization code.

2. The gaming machine system of claim 1 wherein said central computer stores the record of said transfer of funds between each individual gaming machine and the central computer.

3. The gaming machine system of claim 1 wherein said central computer stores the amount of said transferred funds.

4. The gaming machine system of claim 1 wherein:

5 said cash equivalence acceptance apparatus requires the input of an authorizing code before play of said gaming machine.

5. The gaming machine system of claim 4 in which each of said plurality of gaming machines includes a keypad

for a player to input said authorizing code.

6. The gaming machine system of claim 5 and additionally comprising:

security means for making said authorizing code input to said keypad difficult to visually see by an observer.

7. The gaming machine system of claim 6 wherein:

said security means comprises means for positionally changing number positions in said keypad each time it is displayed.

8. The gaming machine system of claim 1 including means for preventing the transfer of said funds without removal of said media from said gaming machine.

9. A gaming machine system comprising:

a plurality of gaming machines each having a memory, a play authorizing input, cash equivalence acceptance apparatus for accepting a unit of cash equivalence and for authorizing a play of said gaming machine at said play authorizing input in response thereto;

a central computer connected to said plurality of gaming machines;

a plurality of media for storing a unique identification code;

write means for writing unique identification codes onto each of said plurality of media;

read means connected to each of said gaming machines for reading said unique identification code from respective ones of said plurality of media;

input means for inputting into said central computer credits associated with said unique identification code;

said central computer transferring said credits  
20 to the memory of said gaming machine in response to entry  
of a PIN associated with said unique identification code.

10. The gaming machine system of claim 9 in which  
said system memory at said central computer also  
stores a record of the electronic transfers of funds  
25 between the central computer and the gaming machine.

11. The gaming machine system of claim 9 wherein:  
each of said plurality of gaming machines  
includes cash acceptance apparatus for accepting a unit of  
cash and for authorizing a play of said gaming machine at  
30 said play authorizing input in response thereto; and  
said cash acceptance apparatus immediately  
authorizes a play of an associated one of said plurality of  
gaming machines at said play authorizing input in response  
to a unit of cash being input thereto.

35 12. The gaming machine system of claim 10 and at each  
of said plurality of gaming machines additionally  
comprising:

a display for displaying alphanumeric messages to  
a player; and,

a keypad for a player to input said pin.

13. The gaming machine system of claim 11 and  
additionally comprising:

an alphanumeric display included as part of each  
of said plurality of gaming machines for game play; and,

5 a touch screen disposed over each said  
alphanumeric display for positional selection inputs on  
said alphanumeric display by a player; and wherein,

said alphanumeric display is used as said display  
for displaying alphanumeric messages to a player; and,

10                   said alphanumeric display and said touch screen  
in combination are used as said keypad.

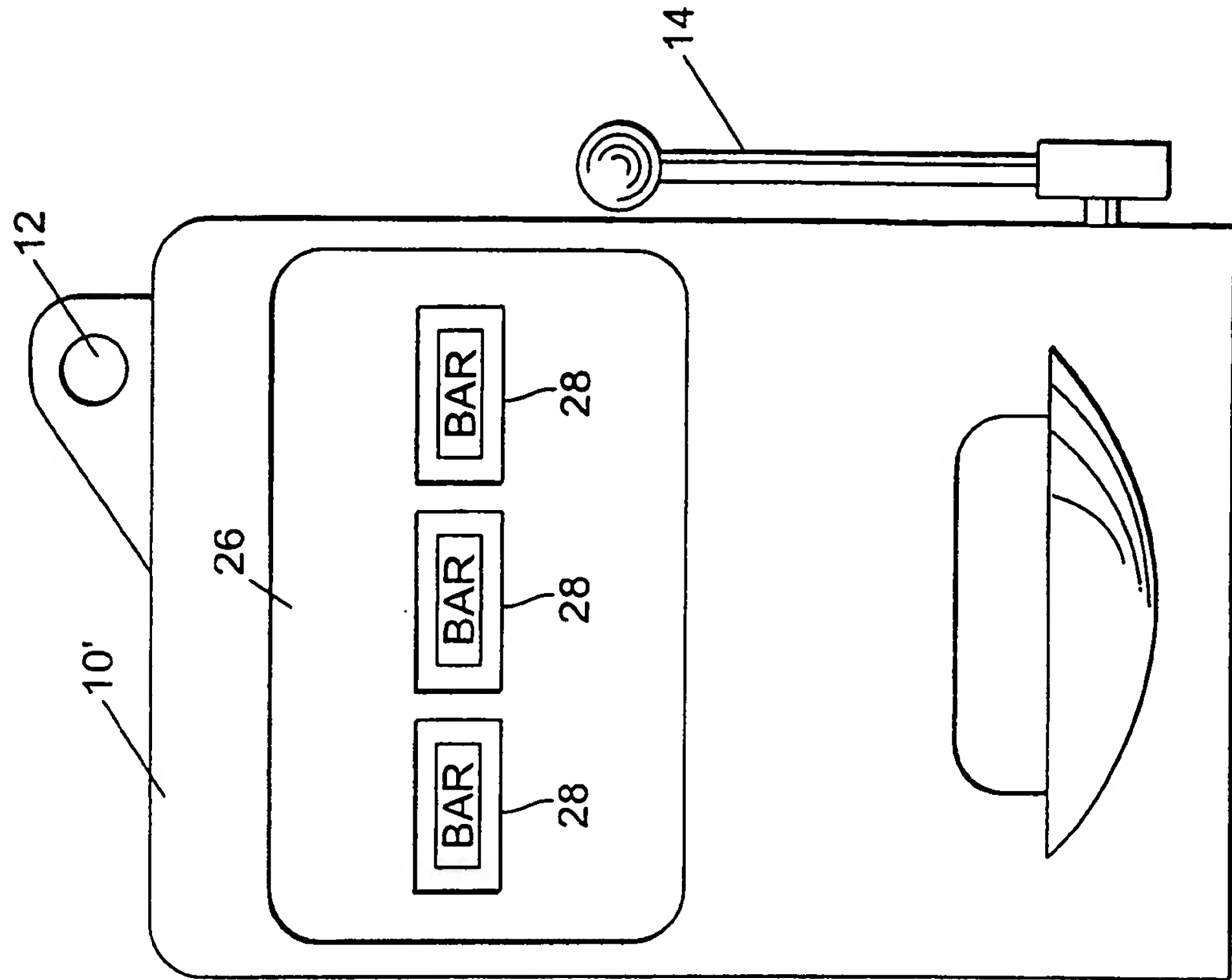
14. The gaming machine system of claim 12 and  
additionally comprising:

security means for making said authorizing code  
input to said keypad difficult to see by an observer.

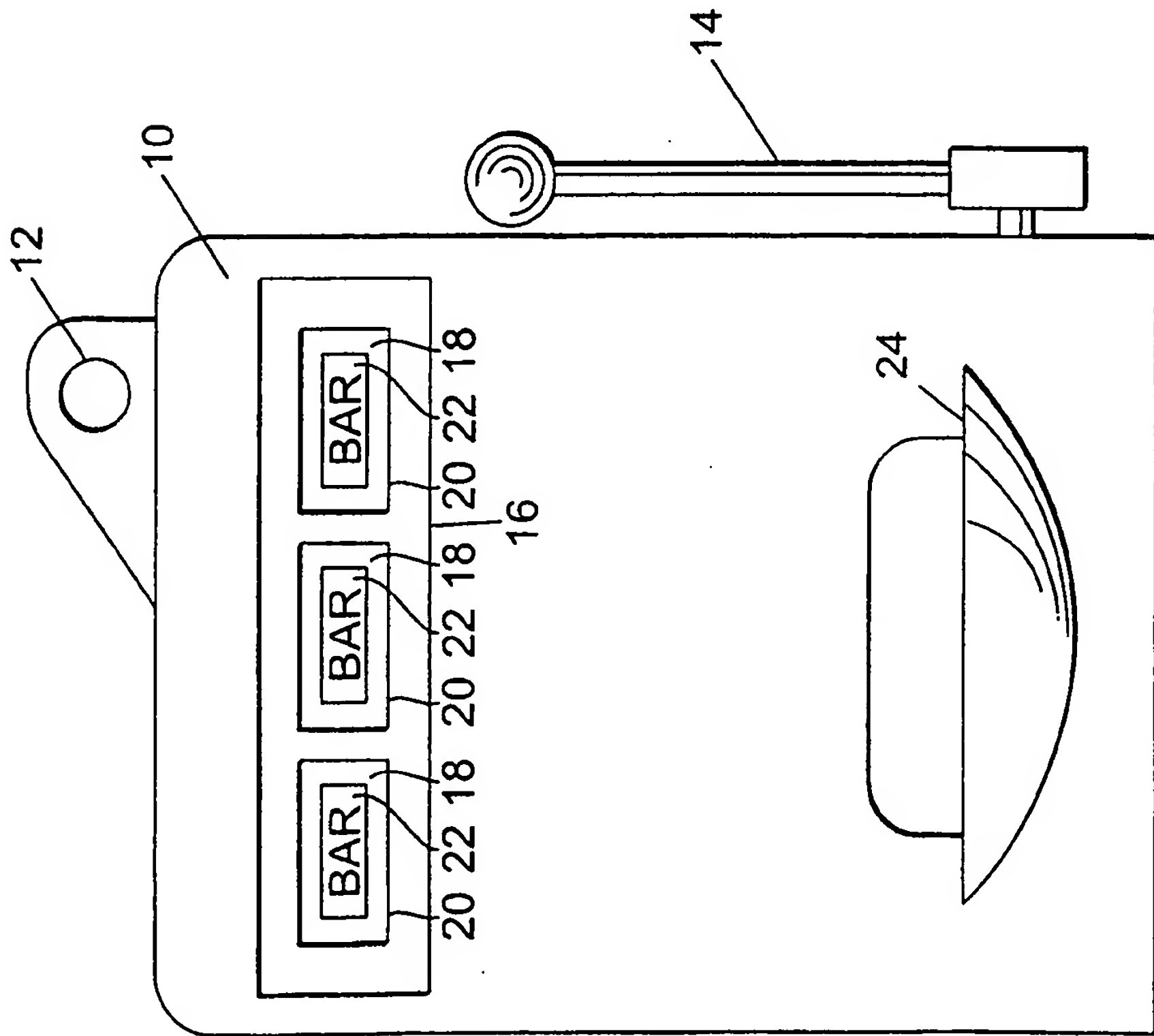
15. The gaming machine system of claim 13 wherein:

said security means comprises means for  
positionally changing number positions in said keypad each  
time it is displayed.

16. The gaming machine as in claim 14 further in  
which said mean for positionally changing the number  
positions is a computer controlled random position  
generator.



PRIOR ART  
Fig. 2



PRIOR ART  
Fig. 1



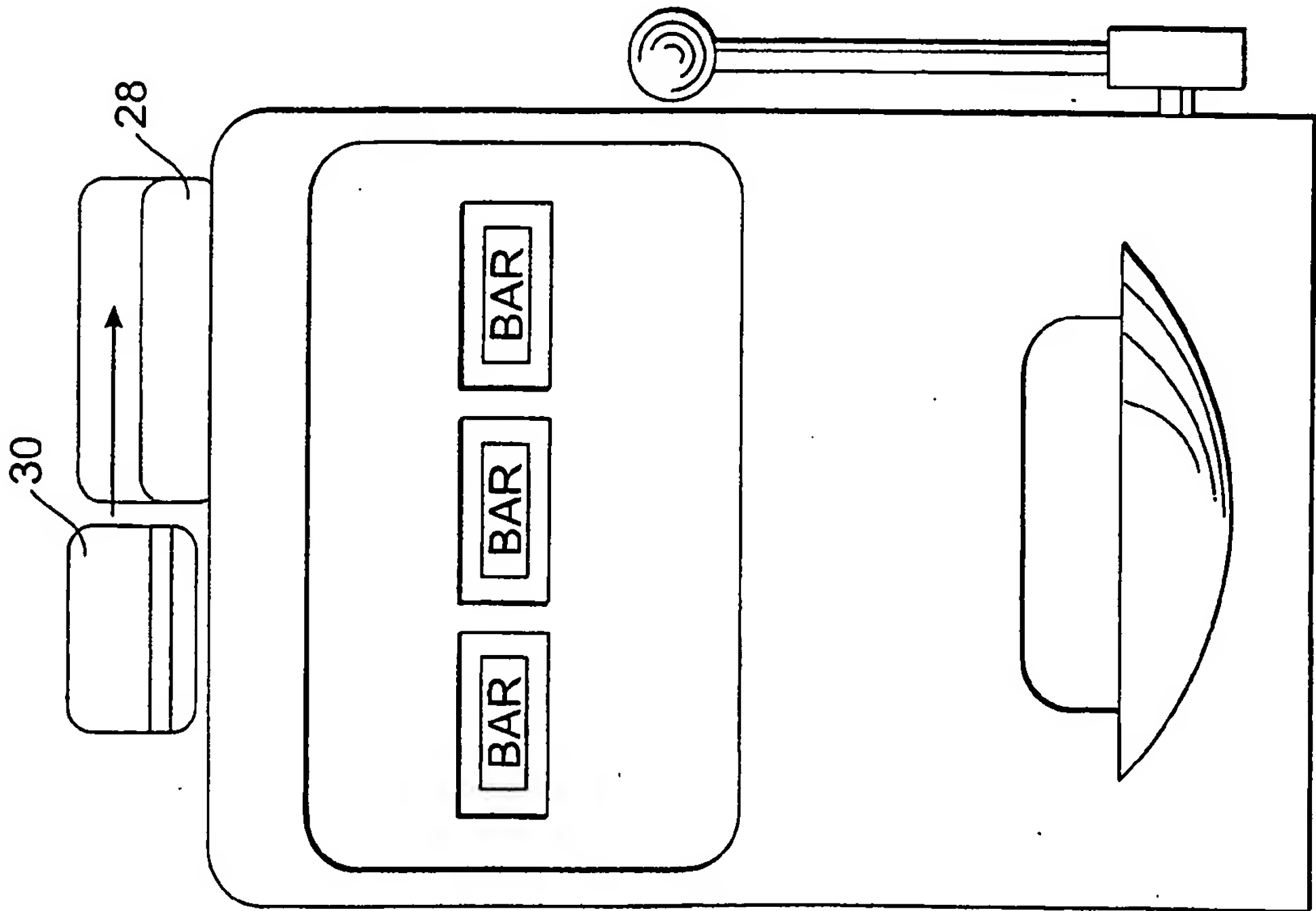


Fig. 3

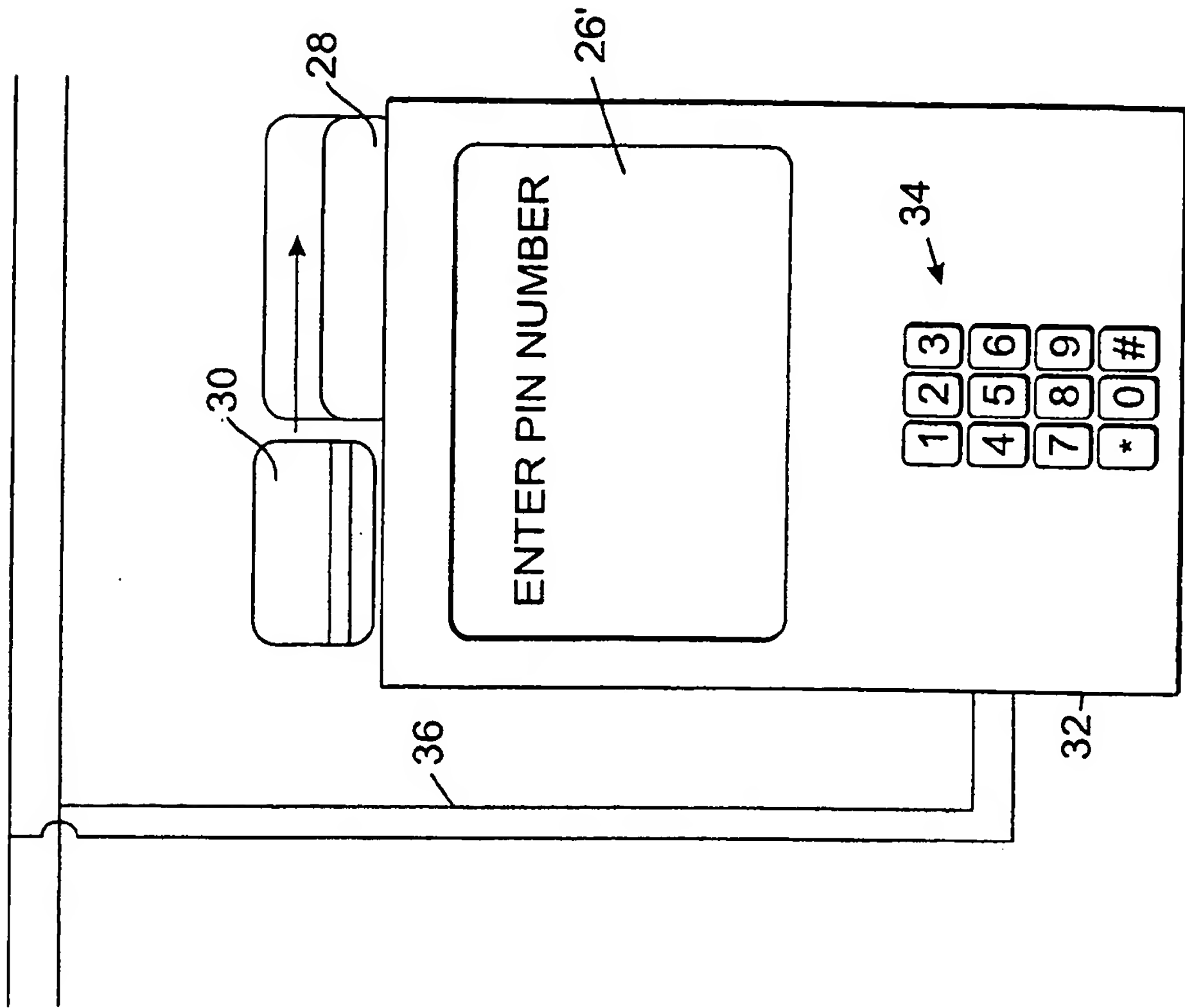


Fig. 4

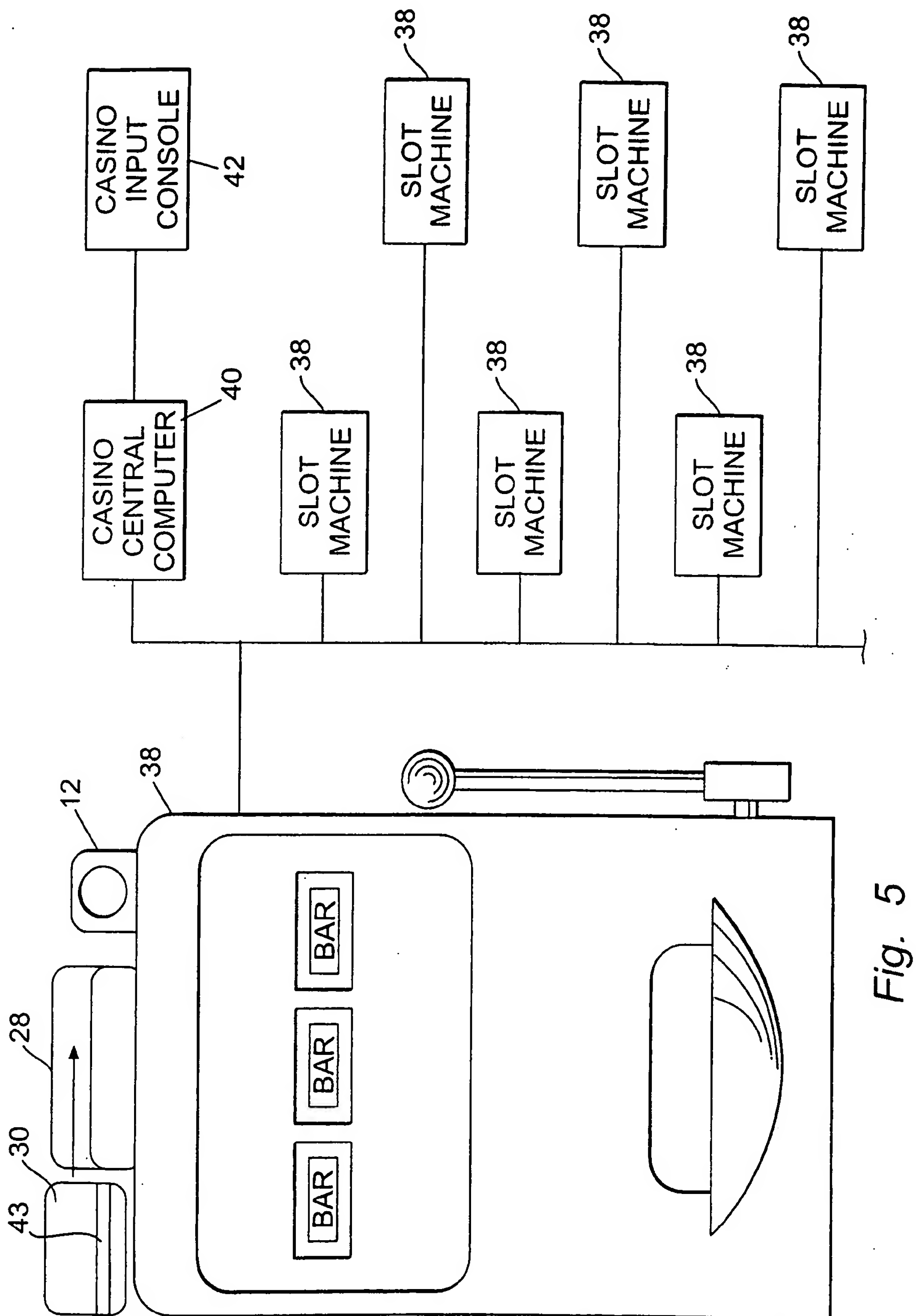


Fig. 5

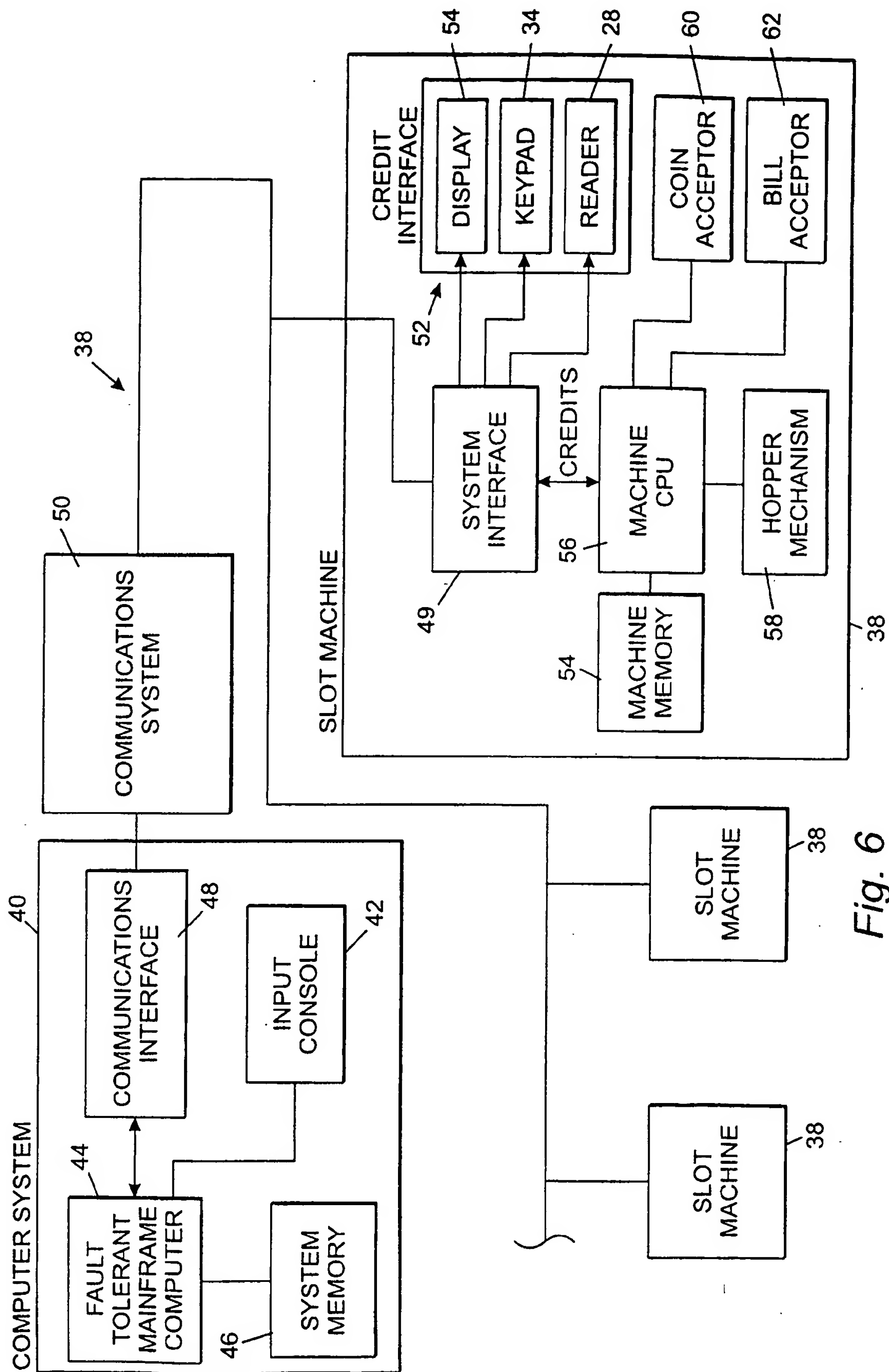


Fig. 6

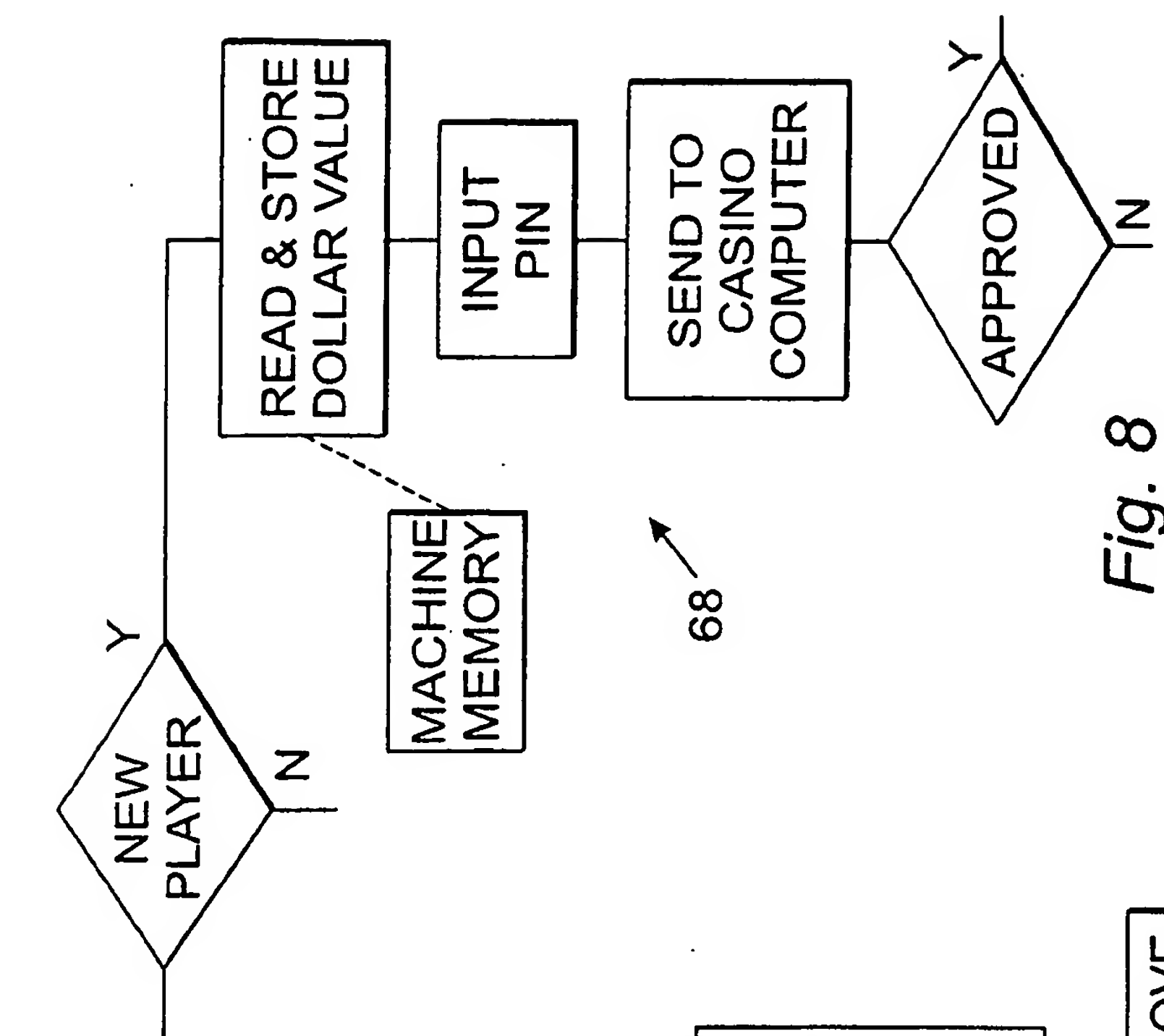


Fig. 8

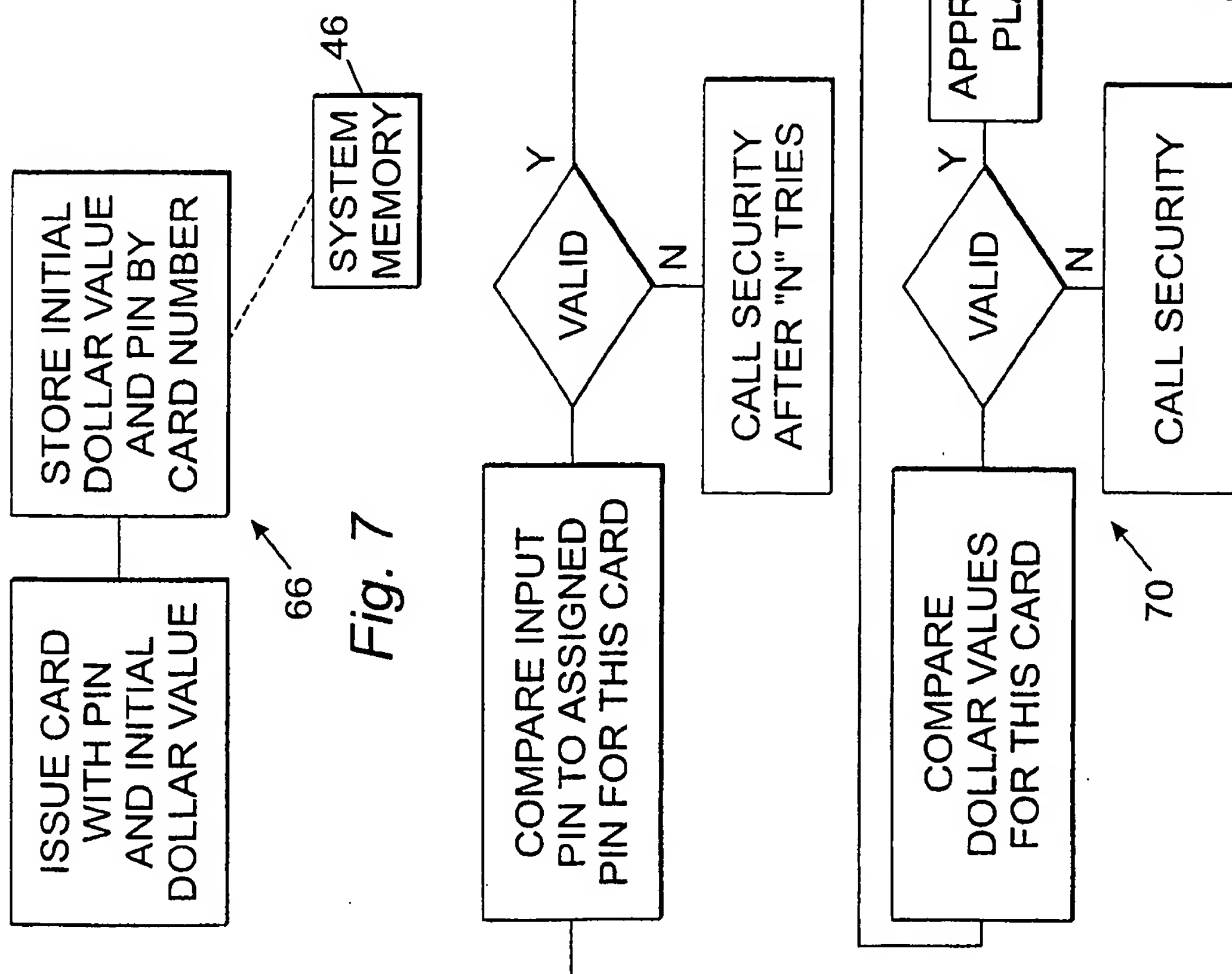


Fig. 9

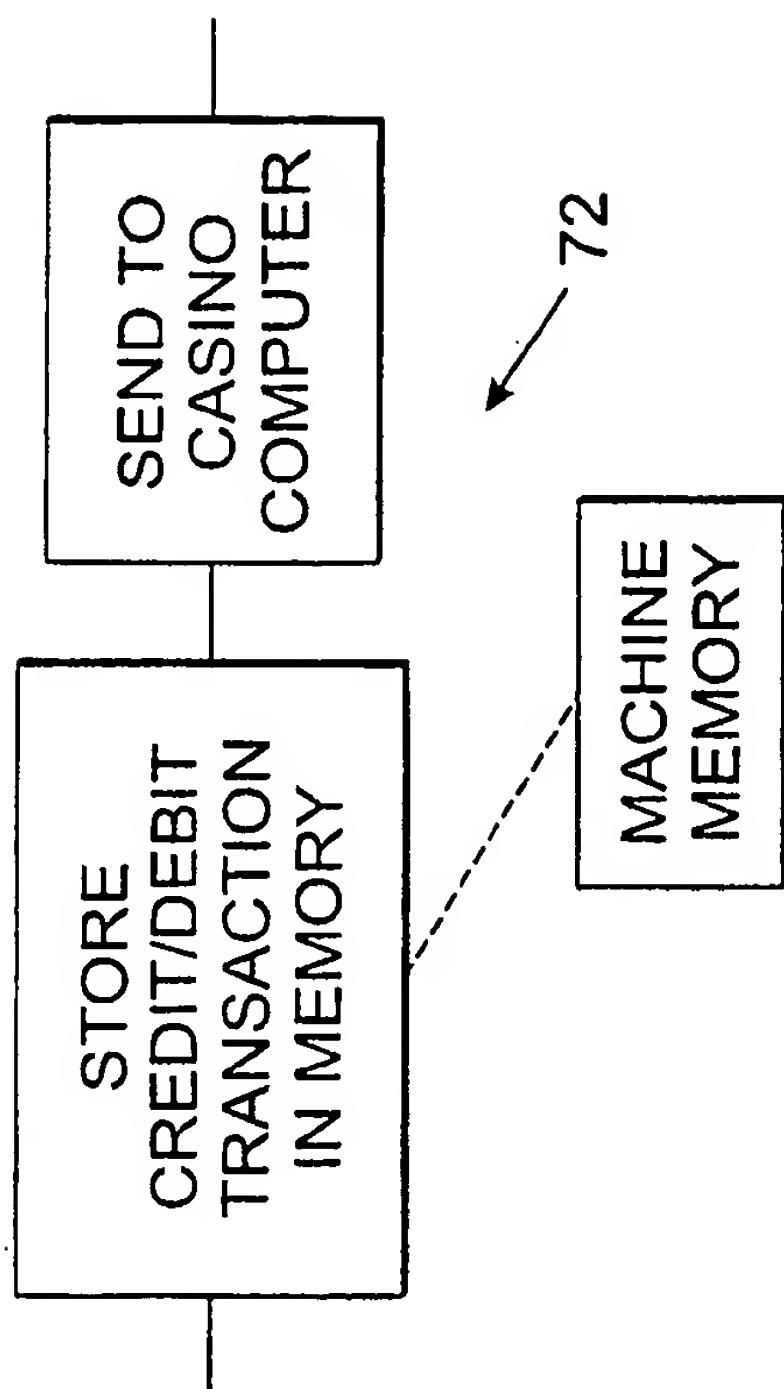


Fig. 10

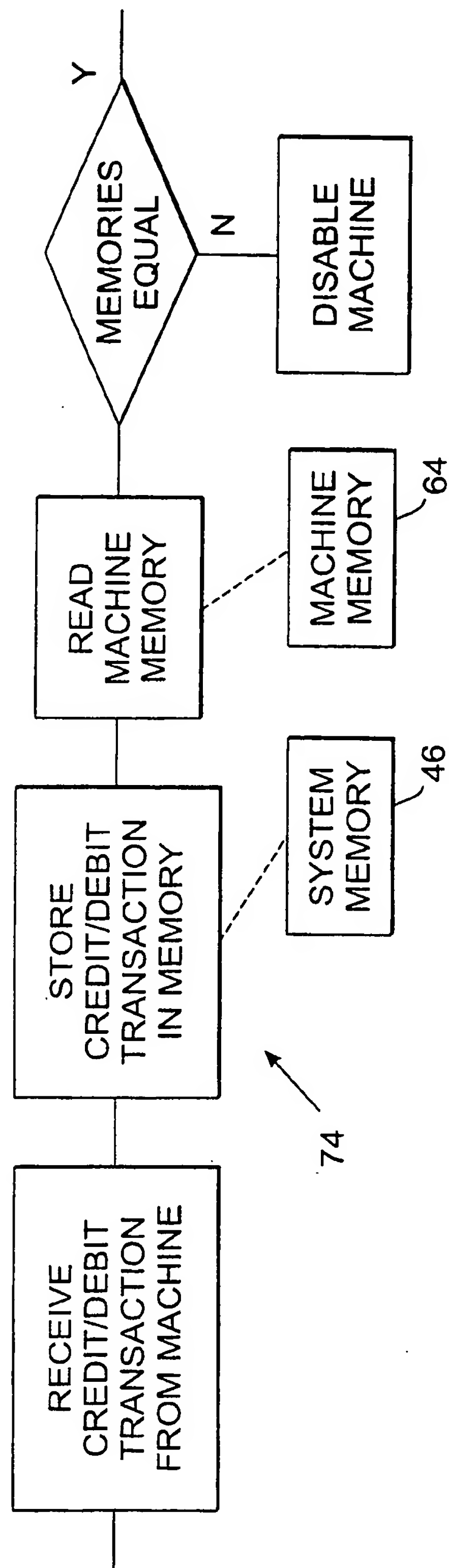


Fig. 11

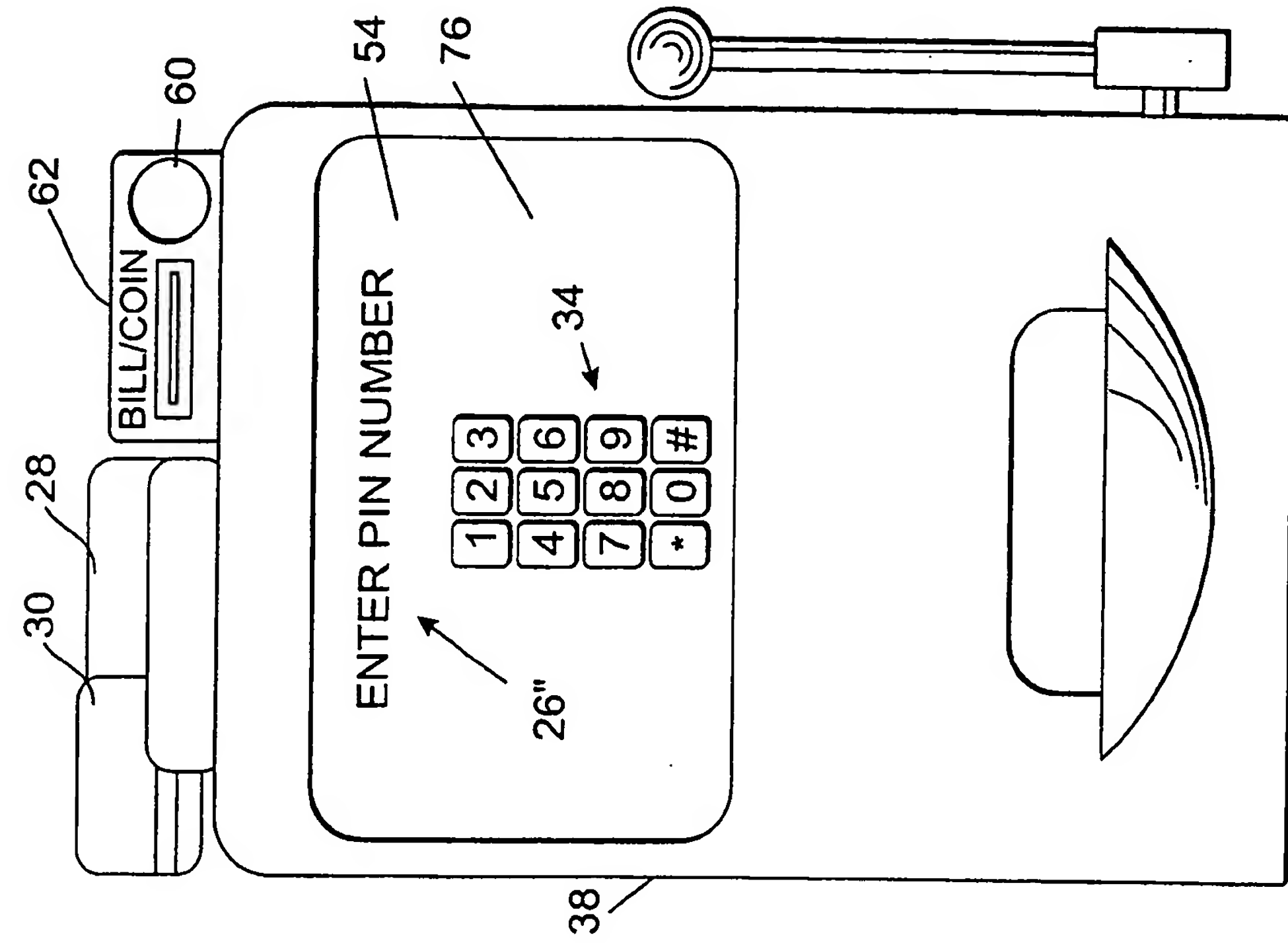


Fig. 12

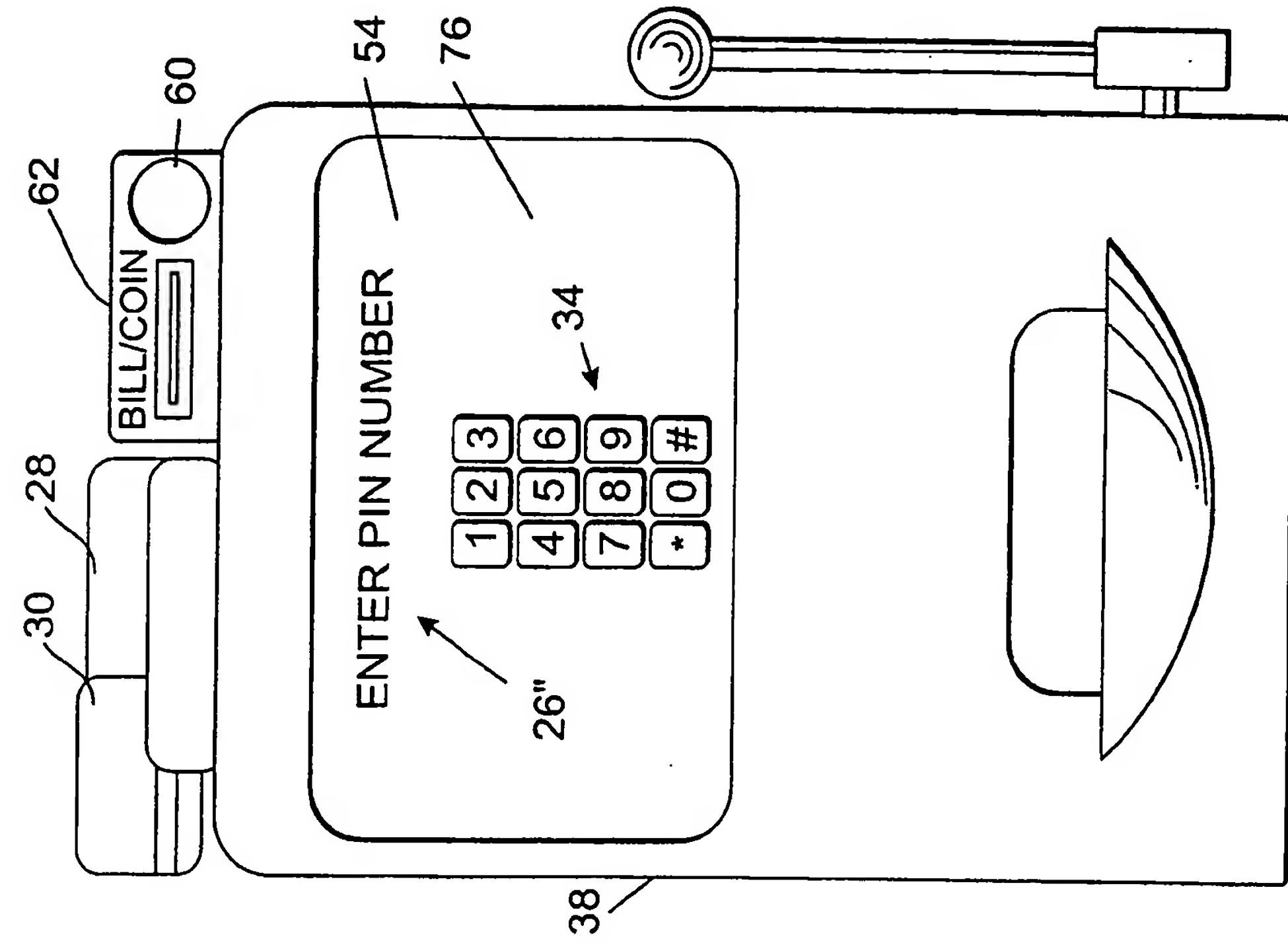


Fig. 13

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/10970

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63B 71/00

US CL :463/25, 29

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/410, 412; 463/1, 20, 25, 29

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US, A, 5,429,361 (RAVEN ET AL.) 04 July 1995, see column 2 line 17 to col 12 line 17, and Figs. 1-3.	1-12 ----- 6, 7, 13-16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

31 AUGUST 1996

Date of mailing of the international search report

01 OCT 1996

Name and mailing address of the ISA/US  
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